

REMARKS

Claims 1-6, 8-22, 28-38, 40-41 were rejected under 35 U.S.C. § 103(a) as being unpatentable over E. Efron et al., U.S. 3,524,731 (hereinafter the '731 patent). Applicants respectfully traverse this rejection based on the claims as previously presented.

Claim 1 claims a distribution device for distributing liquid over an underlying catalyst bed comprising a horizontal collection tray provided with at least one gas chimney for upward or downward passage of gas and with liquid dosing nozzles for downward passage of liquid, wherein the gas chimney(s) and liquid dosing nozzles are separate from each other and do not have the same longitudinal axis, and wherein each liquid dosing nozzle comprises a concentrically arranged liquid passing hole and splash plate, wherein the splash plate is located below the liquid passing hole and below the collection tray such that there is a free fall distance for liquid of at least 100 mm between the hole and the splash plate.

The '731 patent describes an improved and novel distributor for use in packed end reactors wherein a mixed phase is to be passed through a bed. The distributor comprises a plate and a plurality of short tubes and a plurality of relatively longer notched tubes inserted through said plate. The patent states that "[e]ach of the tubes is also provided with an overflow box in the region of its lower end . . . [and] in operation the overflow boxes with their associated slots serve to distribute the liquid flowing through tubes onto bed over an area of larger diameter than would be achieved otherwise." *See* col. 3, line 72 – col. 4, line 8. The patent discloses that the tubes are preferably about 2 inches in length, with about 1 inch projecting above the tray. *See* col. 5, lines 7-9.

It would not have been obvious to one of ordinary skill in the art to use a splash plate and locate that splash plate such that there is a free fall distance for liquid of at least 100 mm between the hole and the splash plate. The specification describes the free fall distance as a distance where the "passing liquid can fall freely between the passing hole and the splash plate, i.e., the liquid jet does not touch a nozzle wall or other structure before impinging on the splash plate." *See* paragraph [0019]. This allows the liquid to gain maximum momentum so that upon impingement with the splash plate, the liquid forms a broad film or droplet spray, which provides a high liquid distribution uniformity.

The '731 patent does not teach or suggest a distribution device such that there is a free fall distance for liquid of at least 100 mm between the hole and the splash plate. The '731 patent as shown in Figures 1 and 3 shows that the liquid passes through a tube and does not fall freely.

The Examiner agrees that the '731 patent "does not disclose that the free fall distance is at least 100 mm between the hole and the splash plate." The Examiner submits however that it would have been obvious to use the claimed free fall distance, since it has been held that where general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. Applicants respectfully disagree and submit that the disclosure of the '731 patent does not teach or suggest the claimed free fall distance.

The disclosure of what could possibly be regarded as a free fall distance is depicted in Figures 1 and 3 and is shown as a gap between the bottom end of the tube and the top of the overflow box. Although there is no representation that the figure is or is not drawn to scale, the dimensions disclosed in the patent provide some additional information that is relevant. As mentioned previously the length of the tubes is preferably 2 inches. From the Figures the top of the overflow box that is presumably full of liquid is close to the bottom of the tube. It would not have been obvious to one of ordinary skill in the art that the top of the overflow box should be located at least 3.9 inches (almost twice the length of the tube itself) from the bottom of the tube. This would have further not been obvious in light of the teaching of the '731 patent that one of the advantages of the '731 patent was an overall reduction in reactor height.

Claims 7, 23-27 and 39 were rejected under 35 U.S.C. § 103(a) as being unpatentable over E. Efron et al., the '731 patent in view of Yoneda et al., US 6,123,323 (hereinafter the '323 patent). Applicants respectfully traverse this rejection based on the claims as previously presented.

The Examiner submits that Figure 7 of the '323 patent discloses that the liquid passing hole has the opening in the collection tray and that it would have been obvious to modify the liquid passing tube of the '731 patent with the liquid passing hole of the '323 patent.

Figure 7 shows a cocurrent flow of gas and liquid, both flowing in the upward direction. It would not have been obvious to one of ordinary skill in the art to modify this teaching with the '731 patent that utilizes the downward flow of the liquid. The purpose of the apparatus depicted in Figure 7 is to separate a gas and liquid mixture into separate gas and liquid phases and it is not clear how this provides any additional teaching that would encourage a modification of the

apparatus disclosed in the '731 patent. The apparatus depicted in Figure 7 is not relevant to the distribution of a downward flowing liquid, and it would not have been obvious to one of ordinary skill in the art to combine the teaching of the '323 patent with the teaching of the '731 patent.

In light of the above, Applicants respectfully request allowance of the claims of this application. Should the Examiner find any impediment to the allowance of this case that could be corrected by a telephone interview, the Examiner is requested to initiate such an interview with the undersigned.

Respectfully submitted,

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